Protecting Chemical Plants

Across the nation, chemical facilities remain unsecured despite their clear vulnerability as terrorist targets. Reports of poor security and a pervasive lack of uniform standards and oversight mean that millions of Americans may be needlessly vulnerable to catastrophic terrorist attacks. Strong legislation must be adopted quickly that will build an effective public-private partnership for assessing the vulnerability and increasing the security of chemical facilities, both in the near and long term.

The United States is home to more than 66,000 chemical production and storage facilities spread throughout our cities, towns, and rural areas. These facilities are essential components of the economy, providing crucial support to U.S. manufacturing, agricultural, and energy sectors, producing valuable products for export, and employing more than one million workers.[1] But chemical plants are also tempting terrorist targets.

Catastrophic releases from facilities that store large quantities of toxic and hazardous materials threaten serious harm to nearby residents and property and could produce severe economic disruption. A 2002 Brookings Institution report ranks an attack on a chemical facility second only to biological and nuclear attacks in terms of possible fatalities.[2] As terrorism expert Jonathan Tucker points out, "hazardous chemicals are ubiquitous in modern industrial society and hence are more accessible to terrorists than either biological or fissile material."[3] Mandatory industry reporting to the Environmental Protection Agency (EPA) indicates that any of 123 facilities in the U.S. could threaten more than one million people in the event of a massive breach of chemical containment,[4] while over 7,000 facilities endanger up to ten thousand people.[5] In 2001, the Army surgeon general suggested that an attack on a chemical plant in a densely populated area could result in up to 2.4 million casualties.[6] The most relevant past experience, the devastating release of a toxic gas cloud from a chemical plant in Bhophal, India in 1984, killed at least 4,000 people and injured an estimated 400,000.[7] Finally, chemicals stored at such sites present a ready source of dangerous material that could be stolen and deployed elsewhere by terrorists.[8]

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[1] American Chemistry Council, *Protecting a Nation: Homeland Defense and the Business of Chemistry*, April 2002.
[2] Michael O'Hanlon and others, *Protecting the American Homeland: A Preliminary Analysis*, (Washington, D.C.: Brookings Institution Press, 2002): 47.
[3] Jonathan B. Tucker, "Chemical Terrorism: Assessing Threats and Responses," *High Impact Terrorism: Proceedings of a Russian-American Workshop*, (Washington, D.C.: National Academy Press, 2002): 117.
[4] Paul R. Kleindorfer, James C. Belke, Michael R. Elliott, Kiwan Lee, Robert A. Lowe, Harold I.Feldman, "Accident Epidemiology and the U.S. Chemical Industry: Accident History and Worst-Case Data from RMP*Info," *Risk Analysis*, 23, no. 5, (2003): 865-881.
[5] Department of Justice, *Assessment of the Increased Risk of Terrorist or other Criminal Activity Associated with Posting Off-Site Consequence Analysis Information on the Internet*, (April 18, 2000): 13.
[6] Office of the Surgeon General, U.S. Army, *Draft Medical NBC Hazard Analysis of Chemical-Biological-Radiological-Nuclear-High Explosive Threat: Possible Scenarios and Planning Requirements*, (October 2001).
[7] Dan Kurzman, *A Killing Wind: Inside Union Carbide and the Bhopal Catastrophe*, (New York: McGraw-Hill, 1987).
[8] Congressional Research Service, *Chemical Plant Security*, RL31520, October 27, 2003.

As "soft" targets, chemical plants have traditionally remained unprotected against a possible terrorist attack. In November 2003, the television magazine *60 Minutes* reported unlocked gates, absent guards, dilapidated fences, and unprotected tanks filled with deadly chemicals at dozens of facilities in major metropolitan areas, including Chicago, Houston, New York, Los Angeles, and Baltimore.[9] In the Pittsburgh area, one reporter found easy access to more than 200 tons of corrosive chlorine gas at four different sites.[10] Some industrial security experts have described industry's recent claims of improved security as "window-dressing" and "exaggerated."[11] Based on these reports, it is reasonable to assume that security lapses exist at many U.S. chemical facilities.

Administration officials themselves have pointed to chemical facilities as vulnerable and likely terrorist targets. Soon after September 11, the Administration directed agencies such as the EPA to remove web-based information about chemical plants that could prove useful to terrorists.[12] In February, 2003, the Administration warned that terrorists "may attempt to launch conventional attacks against U.S. nuclear/chemical industrial infrastructure to cause contamination, disruption and terror."[13] As recently as this past holiday season, Department of Homeland Security (DHS) officials warned of possible targeting of chemical plants by terrorists.[14] The Justice Department has described the threat to chemical plants as "both real and credible" and potentially more dangerous than an attack on a nuclear power plant.[15] Over a year ago, DHS Secretary Tom Ridge and former EPA Administrator Christine Todd Whitman both publicly voiced concern over the fact that chemical plants are attractive targets, stating "voluntary efforts alone are not sufficient to provide the level of assurance Americans deserve" and chemical facilities "must be required to take steps" to improve security.[16]

Today, these statements have not been translated into firm, effective measures to secure our nation's chemical facilities. In the 28 months since September 11, 2001, the Administration has taken only "preliminary steps" towards ensuring the security of these vulnerable facilities.[17] Two independent assessments have given the Administration a "D" grade on chemical plant security.[18] Meanwhile, the vulnerability of chemical plants remains largely unassessed and unaddressed.

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[9] "U.S. Plants: Open for Terrorists," *60 Minutes*, broadcast November 16, 2003.
[10] Carl Prine, "Chemical Sites Still Vulnerable," *Pittsburgh Tribune-Review*, November 16, 2003.
[11] (a) Jeanne Meserve, "Chemical Plants: Are They Safe from Terrorist Attacks?" *Wolf Blitzer Reports-Cable Network News*, broadcast November 17, 2003; (b) Adam Fifield, "How to Reduce Risks of Toxic Disaster" *Philadelphia Inquirer*, April 21, 2003, A1.
[12] "Agencies Censor Sites Deemed Useful to Terrorists," *Associated Press*, October 12, 2001.
[13] Margaret Kriz, "Security Leak," *National Journal*, August 2, 2003, 2476.
[14] U.S. Department of Homeland Security, "Statement by the Department of Homeland Security on Continued Al-Qaeda Threats," November 21, 2003.
[15] James V. Grimaldi and Guy Gugliotta, "Chemical Plants Feared as Targets," *Washington Post*, December 16, 2001, A1.
[16] Thomas Ridge and Christine Todd Whitman, "A Security Requirement," *Washington Post*, October 6, 2002, B6.
[17] U. S. General Accounting Office, *Homeland Security: Voluntary Initiatives Are Under Way at Chemical Facilities, but the Extent of Security Preparedness is Unknown*, GAO-03-439, (Washington, D.C.: GAO, March 2003): 18.
[18] (a) Progressive Policy Institute, *America at Risk: A Homeland Security Report Card*, July 2003, 19, http://www.ppionline.org/documents/HomeSecRptCrd_0703.pdf; (b) Neil Munro and Margaret Kriz, "National Security: Hardening the Targets, *National Journal*, August 10, 2002, 2388.

SECURITY GAP: There Has Been No Comprehensive Assessment of Chemical Facility Vulnerabilities.

In March 2003, the General Accounting Office (GAO) issued a major report pointing out that the lack of chemical plant vulnerability assessments means the extent of security preparedness at U.S. chemical facilities is unknown.[19] This situation is a direct result of the fact that chemical facilities are not required to assess their own vulnerabilities. For those facilities that have conducted assessments, no federal agency has the authority to set standards or review their actions. This information is crucial if the DHS is to carry out its legislative requirement to produce comprehensive assessments of the vulnerabilities of critical infrastructure and integrate relevant information, analyses, and vulnerability assessments in order to identify priorities for protective and support measures.[20] Without these assessments, facility operators, law enforcement and emergency responders may not be prepared to respond appropriately to security threats. The GAO recommended the immediate passage of legislation requiring chemical facilities to assess their vulnerability to terrorist attack. Almost a year later, legislative action remains stalled.

SECURITY RECOMMENDATION

Legislation must be passed that requires the identification of high-risk facilities and requires those facilities to conduct vulnerability assessments and submit these plans to the DHS. The Administration should adopt uniform standards for conducting these assessments. Vulnerability assessments should be reviewed by government officials so that a comprehensive assessment of chemical infrastructure vulnerability can be completed.

SECURITY GAP: There Are No Legal Requirements for Chemical Facilities To Improve Security.

The Administration has relied almost exclusively on voluntary industry efforts to remedy the glaring vulnerabilities of our nations' chemical facilities. The American Chemistry Council (ACC) and the Synthetic Organic Chemical Manufacturer's Association have adopted a "Security Code," which must be followed by association members,[21] and the American Petroleum Institute has published *Security Guidelines for the Petroleum Industry*.[22] While laudable, these industry actions have clearly not been sufficient, given recently reported security gaps at chemical facilities. Voluntary efforts such as these are not practiced by the entire industry, leaving thousands of vulnerable chemical plants without an obligation to make any security assessments or improvements. Although it is the largest industry association, ACC members own only 7% of the 15,000 potentially most hazardous facilities.[23] In addition, membership and participation in such voluntary programs fluctuates without any outside control or oversight. ACC recently lost

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[19] GAO, *Homeland Security: Voluntary Initiatives Are Under Way at Chemical Facilities, but the Extent of Security Preparedness is Unknown*, GAO-03-439, (Washington, D.C.: GAO, March 2003): 30.
[20] Section 201of the *Homeland Security Act of 2002*,codified in 6 U.S.C. 121(d).
[21] Esther D'Amico, "Putting a Lid on Site Security," *Chemical Week*, July 2, 2003, 33.
[22] American Petroleum Institute, *Security Guidelines for the Petroleum Industry*, Second Edition. (Washington, D.C.: API Publishing Services, April 2003).
[23] GAO, *Homeland Security: Voluntary Initiatives Are Under Way at Chemical Facilities, but the Extent of Security Preparedness is Unknown*, GAO-03-439, (Washington, D.C.: GAO, March 2003): 27.

three of its members, each an owner of dozens of chemical facilities that now are no longer covered by the association's "Security Code" program.[24]

The Administration has taken some steps towards addressing chemical security. The Department of Homeland Security announced that it "has visited several hundred facilities in high-threat urban areas,"[25] and that Department personnel "will continue to conduct site visits to assist operators and owners in identifying and reducing vulnerabilities."[26] However, DHS lacks the authority to require reluctant plant operators to actually follow the Department's advice and make security improvements. The Department also does not have the power to conduct mandatory inspections and oversee industry actions to ensure their sufficiency. According to the GAO, "no federal oversight or third-party verification ensures that voluntary industry assessments are adequate and that necessary corrective actions are taken."[27] In the current environment, those facilities that do not invest in security improvements have a competitive advantage over those that are taking voluntary action. Because the risk of attack at any single facility is low, it makes economic sense for owners to avoid making security improvements. To level the playing field, industry leaders have called for "oversight, inspection, and strong enforcement authority at the Department of Homeland Security to ensure that facilities are secure against the threat of terrorism."[28]

SECURITY RECOMMENDATION

Chemical facilities should be required by DHS to develop security plans that address vulnerabilities identified in assessments, and to implement improvements and upgrades. Security plans, including cost estimates, should be submitted and reviewed by government officials to ensure compliance and provide oversight. Strong sanctions should be authorized to compel facilities not in compliance to expeditiously make security improvements. Furthermore, appropriate mechanisms for the pooling and sharing of information about security practices that do not compromise sensitive data should be established. The information DHS collects should be used by both government and industry to assist in constantly improving security strategies. The DHS must partner with EPA, with its expertise in chemical plant operations and hazardous materials handling, in order to strengthen requirements and oversight of security both outside and inside the plant gates.

SECURITY GAP: Chemical Facilities are Not Required To Consider Using Inherently Safer Technologies.

A recent paper by the National Pollution Prevention Roundtable, an organization of scientific and industrial experts, noted that "physical security measures are very much penetrable by those with

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[24] Anne Thayer, "ACC Convenes Amid Upheaval," *Chemical and Engineering News*, November 3, 2003, 10.
[25] The White House, "Fact Sheet: Progress in the War on Terror," press release, January 22, 2004, http://www.whitehouse.gov/news/releases/2004/01/20040122-1.html.
[26] "Department of Homeland Security," *Budget of the United States, Fiscal Year 2005*, (Washington, D.C.: GPO, 2005): 170.
[27] GAO, *Homeland Security: Voluntary Initiatives Are Under Way at Chemical Facilities, but the Extent of Security Preparedness is Unknown*, GAO-03-439, (Washington, D.C.: GAO, March 2003): 30.
[28] American Chemistry Council, "Chemical Industry Security: Much Progress Made But Security Lapses Unacceptable," press release, November 18, 2003.

intent and do not reduce the risk associated with the target of attack."[29] A different approach, one based on new science and technology, is required to truly reduce the attraction of industrial chemicals as weapons for terrorists. According to President Bush's science and technology advisor, Dr. Jack Marburger, technologies that reduce the toxicity, flammability, or other hazardous characteristics of chemicals and their processes "help improve the environment, public health, and competitiveness, but they also inherently reduce the threat of terrorism."[30] Replacing dangerous chemicals and processes with "inherently safer technologies" (IST) will fundamentally diminish and possibly eliminate the danger posed by a chemical facility.[31] Current examples include the use of bleach instead of chlorine gas for water treatment[32] or the replacement of highly toxic and aerosolizable hydrogen fluoride in hydrocarbon alkylation with sulfuric or solid acid catalysis.[33] For the future, numerous opportunities exist to develop new technologies in chemical processing[34] and chemical design[35] to reduce the application of existing hazardous processes and materials. Ultimately, approaches such as these are the only way to remove these facilities from terrorists' target lists.[36] But the Administration has opposed legislation requiring facilities to formally consider adopting IST where practicable[37] and has systematically undermined the chemical security activities of the EPA, the only federal agency with expertise in IST.[38] It has no strategy for developing what the National Research Council calls "safer, intrinsically secure, economically viable chemical processes and procedures."[39]

SECURITY RECOMMENDATION

Chemical facilities should be required to consider adopting IST or other "alternative approaches" that can make a chemical or chemical process less hazardous while retaining cost-effectiveness. Even if these strategies are not adopted, information regarding the economic and technological barriers to its adoption to improve security should be collected and, with the leadership of EPA, an analysis undertaken that will identify opportunities across the industry where IST can improve security and investments can be made in research that will enhance IST and its adoption in the future.

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[29] National Pollution Prevention Roundtable, *White Paper on Pollution Prevention and Homeland Security*, February 11, 2004, http://www.p2.org/whitepapers/p2_and_homeland_security.doc.
[30] Stephen Ritter, "Green Solutions to Global Problems," *Chemical and Engineering News*, September 29, 2003, 33.
[31] Commission on Physical Sciences, Mathematics, and Applications, *Frontiers in Chemical Engineering*: *Research Needs and Opportunities*, (Washington, D.C.: National Academies Press, 1988): 112-113.
[32] James Grimaldi and Guy Gugliotta, "Chemical Plants Are Feared as Targets," *Washington Post*, December 16, 2001, A1
[33] Meghan Purvis and Warren Claflin, *Needless Risk: Oil Refineries and Hazard Reduction*, (Washington, D.C.: USPIRG Education Fund, October 2003): 16-19; http://uspirg.org/reports/NeedlessRisk10_03.pdf.
[34] Board on Chemical Science and Technology, *Beyond the Chemical Frontier: Challenges for Chemistry and Chemical Engineering*, (Washington, D.C.: National Academies Press, 2003): 33-40.
[35] Martin Poliakoff and others, "Green Chemistry: Science and Politics of Change," *Science*, 297, (August 2, 2002): 807-810.
[36] Jeff Johnson, "Simply Safer," *Chemical and Engineering News*, February 3, 2003, 23.
[37] John Mintz, "Bush Seeks Voluntary Chemical Plant Security Steps," *Washington Post*, April 8, 2003, A10.
[38] (a) "Administration Moves to Limit EPA Role in Homeland Security Efforts," *ChemicalPolicyAlert.com*, December 29, 2003; (b) Carl Prine "EPA's Security Push Fails," *Pittsburgh Tribune-Review*, July 14, 2002.
[39] Committee on Science and Technology for Countering Terrorism, *Making the Nation Safer: The Role of Science and Technology in Countering Terrorism*, (Washington, D.C.: National Academy Press, 2002): 132.